REMARKS/ARGUMENTS

Claims 1-34 are pending in this application. Claims 1-5, 11-14, 16, 17, 19-23, 25-31, 33 and 34 are rejected. Claims 27 and 29 have been amended. No new matter has been introduced. Claim 28 has been cancelled. In view of the foregoing amendments and the following remarks, Applicants respectfully request allowance of the application.

Applicants gratefully acknowledge the Examiner's indication that claims 6-10, 15, 18, 24 and 32 contain allowable subject matter. *See* Office Action dated February 25, 2008, para. 4.

AMENDED DRAWINGS

To comply with the Examiner's request, figures 1 and 2 are amended. No new matter is added. Twenty-eight (28) pages of replacement drawings are being submitted and replace any previous drawings submitted.

35 USC § 112 REJECTION

Claim 29 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicants contend that claim 29 is not indefinite, and indeed, could not be more definite. A claim is indefinite only if a worker of ordinary skill could not determine the scope of the claims from the language provided. By referring back to figures 20A-B, claim 29 describes, in no uncertain manner, the values stored in the lookup table. Claim 29 would be well understood by a worker of skill and, therefore, the indefiniteness rejection to claim 29 should be withdrawn.

Applicant notes that the Office has granted other patents that refer expressly to tables listed in the patents' specifications. See, for example, U.S.P. 6,431,144, claims 28-29, 36-37 and U.S.P. 6,654,428, claims 19-20.

PRIOR ART REJECTIONS

Claims 1, 11, 13, 14, 17, 22 and 27-29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fukuda et al. (US 6,532,262) in view of Chiang et al., A new rate Control Scheme Using Quadratic Rate Distortion NModel, IEEE, 1996, pgs. 73-76. Claims 2, 4, 16, 20, 21, 23, 25, and 33 are rejected as obvious over Fukuda, Chiang and Hanamura et al. (US

6,587,508 B1). Claims 3 and 26 are rejected as obvious over Fukuda, Chiang, Hanamura and Blinn, Quantization Error and Dithering, IEEE Computer Graphics and Applications, 1994, Pgs. 78-82. Claims 5 and 12 are rejected as obvious over Fukuda in view of Chiang and also Hanamura in view of Blinn. Applicants respectfully request withdrawal of the outstanding rejections.

CLAIMS 1-10 DEFINE OVER THE PRIOR ART

Independent claim 1 recites:

> **first memory to store predetermined values of quantizer selections and coding rates, the table indexed by a complexity indicator signal,**
> **second memory to store quantizer selections and coding rates of previously coded P pictures, and**

The combination of Fukuda and Chiang does not teach or suggest the quantizer estimator recited in claim 1. In particular, the combination of Fukuda and Chiang does not teach at least a ***first memory*** to store predetermined values of quantizer selections and coding rates, the table indexed by a complexity indicator signal; or, a ***second memory*** to store quantizer selections and coding rates of previously coded P pictures.

Fukuda, which the Examiner cites as teaching these elements, discloses a coder adapted to reproduce a signal of quality at a low coding rate even when a video or audio signal continuously supplied thereto should be coded in real-time. (Fukuda Abstract). The Examiner references Fukuda's scene parameter determiner 110 as a first memory to store predetermined values of quantizer selections and coding rates, the table indexed by a complexity indicator signal. The scene parameter determiner 110 consists of an assigned coefficient calculator 121 and a quantization parameter determiner 122 (Fukuda, FIG. 1). The scene parameter determiner 110 is described as follows:

> The scene parameter determiner 110 determines the second quantization parameter Q2 depending on the complexity of coding by using the number of bits B of the coded data Sc generated during the predetermined interval as the scene information of the video signal Sv. For example, if the complexity is high, then the determiner 110 determines the quantization parameter Q2 at such a value as increasing the coding rate.

(Fukuda, Col. 8, 59-66). The assigned coefficient calculator 121 "outputs an assigned coefficient a in accordance with a predetermined target rate," and the quantization parameter determiner 122 "outputs the second quantization parameter Q2 best suited to an individual scene responsive to the quantization parameter Q1 stored on the memory 112 a predetermined time ago and output therefrom, the number of bits generated B and the assigned coefficient a output

from the assigned coefficient calculator 121." (Fukuda, Col. 10, 44-52). Fukuda does not disclose this calculator 121 to be ***a memory of any kind***. Applicants can find nothing in Fukuda that teaches a memory to store ***predetermined values of quantizer selections and coding rates***, which is ***indexed by a complexity indicator signal***. To the extent the assigned coefficient calculator 121 stores anything, it is only assigned coefficients that are output to the quantization parameter determiner 110, not predetermined quantizer selections and coding rates. Therefore, Fukuda does not teach or suggest the first memory recited in claim 1.

The Examiner points to figures 1, 9 and 11 of Fukuda as teaching a second memory to store quantizer selections and coding rates of previously coded P Pictures. Although Fukuda illustrates a memory 112 for storing quantizer values, Fukuda does not disclose storage of ***quantizer selections of previously coded P pictures***. Moreover, Fukuda has no disclosure that this memory 112 stores ***any coding rates of previously coded P Pictures***.

For at least these reasons, Applicants believe that the rejection of claim 1 should be reconsidered and withdrawn. Claims 2-10 depend from independent claim 1 and are allowable for at least the reasons applicable to claim 1, as well as due to the features recited therein.

CLAIMS 2-3 DEFINE OVER THE PRIOR ART

Dependent claim 2 recites:

> **a second selector, coupled to the second memory, to select a maximum value of two previous quantizer selections,**
>
> **wherein the first selector selectively enables the second selector when the picture type signal indicates a B picture.**

The combination of Fukuda, Chiang, and Hanamura does not teach or suggest the quantizer estimator recited in claim 2. In particular, the combination of Fukuda, Chiang, and Hanamura does not teach a second selector, coupled to the second memory, to select a maximum value of two previous quantizer selections, wherein the first selector selectively enables the second selector when the picture type signal indicates a B picture. The Examiner concedes that Fukuda and Chiang are silent as to these particular elements, and Applicants agree. However, Applicants respectfully disagree with the Examiner that Hanamura supplies these deficiencies.

Hanamura teaches an apparatus for transcoding a coded moving picture sequence comprising a rate controller for adapting the scaling factor to perform the rate control over the coded moving picture sequence signal having a desired target bit rate (Hanamura Abstract). The Examiner cites no passages of Hanamura and only figures 8 and 9 in support of the

argument that Hanamura teaches the above-highlighted elements. Figures 8 and 9 are described as follows:

> Referring to FIGS. 8 and 9 of the drawings, there are shown graphs of the experimental simulation results for characteristics of the relationship between an average quantization error "D" and a reduced information volume "R.sub.red ". FIG. 8 shows a graph for the intra macroblock, while FIG. 9 shows a graph for the inter macroblock. The characteristics of the relationship between the average quantization error D and the reduced information volume R.sub.red are representative of the rate-distortion performance in converting the first quantization level (Q.sub.1.times.level) into the second quantization level (Q.sub.2.times.tlevel).

(Hanamura, Col. 30, 45-55). The experimental simulation results shown in figures 8 and 9 are related to the calculations done by the quantization parameter calculator 412 shown in figure 7, which is described as being designed to "calculate the second quantization parameter Q.sub.2 (j) for each of macroblocks MB(j) by correcting the re-quantization parameter Q(j) on the basis of the first quantization parameter Q.sub.1 (j) for each of macroblocks MB(j)." (Hanamura, FIG. 7; Col. 30, 23-28, 42-44). Nothing in the above descriptions supports the claim that these figures teach a second selector, coupled to the second memory, to **select a maximum** value of two **previous quantizer selections**, much less a second selector that is **enabled** by a first selector when the picture type signal indicates a **B picture**.

For at least these reasons, Applicants believe that the rejection of claim 2 should be reconsidered and withdrawn. Claim 3 depends from claim 2 and is allowable for at least the reasons applicable to claim 2, as well as due to the features recited therein.

CLAIMS 11-19 DEFINE OVER THE PRIOR ART

Independent claim 11 recites:

> A method of estimating a quantizer for pictures of a video sequence, comprising:
> **for an I picture, estimating a quantizer according to a linear regression analysis upon assumed values of quantizers and coding rates, the assumed values derived from a complexity indicator of the I picture,**
> for a P picture, estimating the quantizer according to the linear regression analysis upon values of quantizers and coding rates of prior P pictures, and
> **for a B picture, selecting the quantizer estimate from a maximum of quantizer selections of two most-recent P pictures.**

The combination of Fukuda and Chiang does not teach or suggest the method of estimating a quantizer as recited in claim 11. In particular, the combination of Fukuda and Chiang does not teach at least for an I picture, estimating a quantizer according to a linear regression analysis upon assumed values of quantizers and coding rates, the assumed values derived from a

complexity indicator of the I picture; or, for a B picture, selecting the quantizer estimate from a maximum of quantizer selections of two most-recent P pictures.

With respect to the I picture element, the Examiner references the following passage from Fukuda:

> A quantization parameter QT, which is associated with an average number of bits BA equal to the target number of bits BT, can be obtained based on the average complexity XA, *QT=XA/BT*

(Fukuda, Col. 12, 59-63). XA is the product of "an average quantization parameter QA and an average number of bits BA" during some interval, which "may be one minute." (Fukuda, Col. 12, 25-29, 53-57). In other words, any assumed values of quantizers and coding rates derived are derived from an **average**, over some interval, of quantization parameters and bit volumes, which is not the same thing as deriving such values from **a complexity indicator of the I picture**.

With respect to the B picture element, the Examiner references two passages from Fukuda, both of which are recited in their entireties below.

> The second quantization parameter Q2, which is selected at the first frame appearing after the scene change, is stored on the memory 112. At the next frame, the selector 113 selectively outputs the quantization parameter Q2 that was stored on the memory 112 as Q1. In other words, the second quantization parameter Q2 that was stored on the memory 112 at the time of scene change is output as the quantization parameter Q. Thereafter, the output Q of the selector 113 is stored again in the memory 112. Accordingly, in the GOP2 coming up next to the scene change, the quantization parameter Q2, which was determined by the scene parameter determiner 110 at the time of scene change, is continuously used for quantization processing. •••
>
> The scene parameter determiner 110 includes an assigned coefficient calculator 121 and a quantization parameter determiner 122. The assigned coefficient calculator 121 outputs an assigned coefficient a in accordance with a predetermined target coding rate. The quantization parameter determiner 122 outputs the second quantization parameter Q2 best suited to an individual scene responsive to the quantization parameter Q1 stored on the memory 112 a predetermined time ago and output therefrom, the number of bits generated B and the assigned coefficient a output from the assigned coefficient calculator 121.

(Fukuda, Col. 9, 53-65; Col. 10, 43-53). The first passage discusses simply reusing a previously determined quantizer value, and the second passage merely discusses the three inputs that the quantization parameter determiner 122 uses to inform its output of the second quantization parameter Q2 (as discussed above in conjunction with claim 1). Nowhere in these passages, nor, as far as Applicants can tell, anywhere else in Fukuda, is it taught or suggested that a

quantizer is selected from a **maximum** of quantizer selections, much less that those quantizer selections are from the **two most-recent P pictures**.

The Examiner also references figures 2A-B as teaching the subject element. However, nothing in Fukuda's description of figures 2A-B teaches selecting a quantizer from a maximum of quantizer selections, and again, certainly not from the two most-recent P pictures. The closest Fukuda comes is where he says:

> In a scene that is more difficult to code than other scenes, however, even if the quantization parameter is increased, a sufficiently high coding rate still can be attained. Accordingly, after the scenes have been changed, the second quantization parameter Q2 is set larger than the previous one as shown in FIG. 2B.

(Fukuda, Col. 9, 46-52). This, however, teaches only that where a scene change has been detected, the second quantization parameter Q2 will output, for the current picture, a larger quantizer value than was previously output by the selector 113 (i.e., Q1 in FIG. 2 before the scene change); there is no selection of the maximum quantizer estimate of the two most-recent P Pictures.

For at least these reasons, Applicants believe that the rejection of claim 11 should be reconsidered and withdrawn. Claims 12-21 depend from independent claim 11 and are allowable for at least the reasons applicable to claim 11, as well as due to the features recited therein.

CLAIMS 22-26 DEFINE OVER THE PRIOR ART

Independent claim 22 recites in part:

> generating a first quantizer estimate for the new P picture based on the linear regression analysis and with reference to a target coding rate assigned to the new P picture,
> **generating a second quantizer estimate for the new P picture as a median of a second predetermined number of the previously coded P pictures,**
> **based on a difference between the first quantizer estimate and a quantizer of a most recently coded P picture, selecting one of the first or the second quantizer estimates as a final quantizer estimate for the P picture.**

The combination of Fukuda and Chiang does not teach or suggest the method of estimating a quantizer as recited in claim 22. The Examiner asserts that Fukuda teaches generating a second quantizer estimate for the new P picture as a median of a second predetermined number of the previously coded P pictures. Applicants respectfully disagree. The most relevant passage Applicants can find in Fukuda is where he teaches that the "**assigned coefficient** is

preferably obtained based on an **average** of quantization parameters during a predetermined **interval** before the scene change is detected and an **average** of numbers of bits generated during the predetermined **interval**," which is wholly different from generating a second **quantizer estimate** for the new **P picture** as a **median** of a second predetermined **number** of the **previously coded P pictures**. (Emphasis Applicants'). (Fukuda, Col. 3, 49-54). Moreover, and as discussed above in conjunction with claim 1, an assigned coefficient is not the same thing as a quantizer estimate. Fukuda's assigned coefficient is simply one of three inputs into the quantization parameter determiner 122, which ultimately determines a quantization parameter Q2. (Fukuda, FIG. 1).

The Examiner asserts also that Fukuda teaches selecting from first and second quantizer estimates a final quantizer estimate for the P picture based on a difference between the first quantizer estimate and a quantizer of a most recently coded P picture. Again, Applicants respectfully disagree. Fukuda's selector 113 chooses which of three different quantizers to use for the current picture (Fukuda, FIG. 1). The selection process is described as follows:

> (Selection of Quantization Parameter)
> The selector 113 usually selects the output Q1 of the memory 112, but occasionally selects the output Q3 of the rate-controlling-parameter determiner 111 at regular intervals. This is done to suppress deterioration in image quality by minimizing the variation in quantization parameter Q. For example, supposing intra-frame coding and inter-frame coding are performed alternately and periodically during the same coding processing, the output Q3 of the rate-controlling-parameter determiner 111 may be selected during the intervals in which the intra-frame coding is performed.
> Also, if a scene change has been detected by the scene change detector 114, then the selector 113 selects the second quantization parameter Q2, which is the output of the scene Parameter determiner 110.

(Fukuda, Col.9, 16-31). Applicants can find no passage in Fukuda that teaches that the selector 113 chooses which of the three quantizer values to use for the P picture based on a difference between a first quantizer estimate and a quantizer of the most recently coded P picture. Indeed, the decision as to which of the three quantization parameters input to the selector 113 (i.e., Q1, Q2, and Q3 of FIG. 1) to use is decided before all of the quantization parameters have been determined – the quantization parameters are not compared. Also, and as per the argument above, Fukuda can not teach selecting one of the first or the second quantizer estimates as a final quantizer estimate for the P picture, because the second quantizer estimate in the present invention is generated as a median of a second predetermined number of the previously coded P pictures, which generation of second quantizer estimate is not taught by Fukuda.

For at least these reasons, Applicants believe that the rejection of claim 22 should be reconsidered and withdrawn. Claims 23-26 depend from independent claim 22 and are allowable for at least the reasons applicable to claim 22, as well as due to the features recited therein.

AMENDED CLAIMS 27-34 DEFINE OVER THE PRIOR ART

Currently amended independent claim 27 recites in part:

> deriving coefficients for linear regression analysis by referring a complexity indicator of the I picture to a lookup table of coefficient values,

Neither Fukuda nor Chiang, either alone or in combination, teach or suggest at least the above-highlighted features of independent claim 27 for at least those reasons discussed above in conjunction with claim 1. Specifically, neither Fukuda nor Chiang teach or suggest referring a complexity indicator of the I picture to a lookup table of coefficient values.

For at least these reasons, Applicants believe that the rejection of claim 27 should be reconsidered and withdrawn. Claims 29-34 depend from independent claim 27 and are allowable for at least the reasons applicable to claim 27, as well as due to the features recited therein.

CONCLUSION

In view of the above amendments and arguments, it is believed that the above-identified application is in condition for allowance, and notice to that effect is respectfully requested. Should the Examiner have any questions, the Examiner is encouraged to contact the undersigned at (408) 975-7963.

The Commissioner is authorized to charge any fees or credit any overpayments which may be incurred in connection with this paper under 37 C.F.R. §§ 1.16 or 1.17 to Deposit Account No. 11-0600.

Respectfully submitted,

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